SECTION 616
CONDUITS AND PULL BOXES

616.01 DESCRIPTION. This work is furnishing and installing plastic and steel electrical conduit, including fittings, junction boxes, pull boxes, and accessories.

616.02 MATERIALS. Furnish materials meeting the following requirements:

Conduit	Subsection 703.02
Pull Boxes	Subsection 703.03

616.03 CONSTRUCTION REQUIREMENTS.

616.03.1 General. Install conduit and pull boxes meeting the National Electric Code (NEC) requirements.

Conduit lengths in the Contract are estimated, and may require changes, approved by the Project Manager, to avoid underground obstructions. Refer to Subsection 107.18 regarding locating of underground utilities before excavation.

Provide the specified conduit size, or substitute a larger size conduit at Contractor expense. Do not change conduit size within any conduit run. Use minimum 2-inch (53 mm) diameter conduit between pull boxes and adjacent standard bases.

Install pull boxes and conduits as specified with the pull box covers flush with the concrete facing or as directed.

Compact backfill material for conduit trenches constructed outside of the roadbed sections to the density of the adjacent material.

Restore existing surfaces disturbed by conduit or pull box installations to the original type and condition.

616.03.2 Plastic Conduit. Excavate trenches for plastic conduit a minimum 24-inches (610 mm) deep. Tamp the trench bottom and bed with 2-inches (50 mm) of sand before laying the conduit. Once the conduit is placed, place and compact sand, or soil free of rocks or hard lumps, 6-inches (155 mm) above the pipe. Complete the backfill using material passing a minus 3-inch (75 mm) screen.

Join conduit using a solvent-welded slip-fitter coupling to provide a watertight joint.

Separate plastic parallel and perpendicular conduit runs from each other with at least 3-inches (75 mm) of sand or soil cushion. Cap open ends of conduit to prevent moisture, dirt, or rocks from entering the conduit.

Terminate plastic conduit runs at least 9-inches (230 mm) from the pullbox or foundation with a plastic threaded adaptor. Thread a rigid steel conduit bend into the adaptor for the pullbox or foundation entry. Use insulated bushings and electrically bond the steel conduit ends.

For plastic conduit runs 300 feet (91 m) or longer, leave one end disconnected or insert an "O" ring expansion coupling near one end of the run.

616.03.3 Steel Conduit. Install rigid conduit meeting the National Electrical Code Article 346.

Use the size and type of conduits and fittings specified in the Contract.

Make field cuts square and true so that the ends will join full circumference. Ream the conduit ends to remove burrs and rough edges.

Slip joints or running threads are not permitted for coupling conduit. Use an approved threaded union coupling when a standard coupling cannot be used.

Coat any new threads on conduit with a cold galvanizing compound before making couplings.

Tighten couplings until the conduit ends are brought together making a good electrical connection throughout the entire conduit run.

Paint damaged conduit coating with a cold galvanizing compound.

Thread and cap conduit with standard pipe caps until the wiring is placed. Install insulated grounding bushings when caps are removed.

Terminate conduit in standard or pedestal foundations at least 3-inches (75 mm) from the foundation top. Keep conduit within foundations at least 6-inches (155 mm) from the foundation face.

Have conduit enter the foundation at least 24-inches (610 mm) from the top. Conduit stubs on structures are specified in the Contract. Paint conduit stubs, caps, and exposed threads with rust-preventative paint.

Mark the conduit end locations in structures and at curbs directly above the conduit end by cutting a minimum 3-inch (75 mm) "Y" into the curb face, gutter, or wall.

Make conduit field bends having a minimum radius of six times the inside diameter of the conduit. Factory conduit bends must not crimp or flatten the conduit and use the longest practical radius.

Place and securely hold in position conduit ends, anchor bolts, and other fittings set in concrete until the concrete sets.

Lay conduit a minimum of 18-inches (460 mm) below the curb grade in sidewalk areas and not less than 24-inches (610 mm) below the finished grade in all other areas.

Install conduits under railroad tracks to railroad company requirements. Notify the Department and the railroad company at least 48 hours before starting work on railroad property.

Place conduits installed under an existing roadway as specified.

Jack or drill conduits without damaging the roadway surface.

Open cut highways only if other methods have failed and if approved by the Project Manager. The Project Manager may approve cutting small test holes in the roadway surface to locate obstructions. Keep jacking and drilling pits at least 2 feet (610 mm) away from the roadway surface edge. Do not undermine the roadway surface or soften subgrade when using water.

When approved by the Project Manager, trench across paved roadways without disturbing or injuring the paved surface on both sides of the trench.

Cut asphalt pavements leaving a straight cut face. Excavate, install conduit, and backfill with approved material. Fill the top 1 foot (305 mm) of the trench with compacted plant mix or as directed. Replace all damaged pavement.

Compact backfill material in the roadbed section to at least 95 percent of maximum density at optimum moisture content meeting Subsection 203.03.3 requirements.

Extend conduit terminating in standards or pedestals above the foundation and slope it towards the handhole opening. Terminate conduit entering concrete pull boxes 2-inches (50 mm) inside the box wall, at least 2-inches (50 mm) above the bottom, and slope it to aide cable pulling. Locate conduit entrances in pull box bottoms near the end walls leaving most of the box clear. Install conduit outlets in the box from the direction of the run. Seal conduit leading into socket walls, lights, or fixtures below the pull box grade using a watertight sealing compound.

Install a pull wire in all unused conduits over 10 feet (3 m) long. Double at least 2 feet (610 mm) of pull wire back into the conduit at each termination point for runs over 100 feet (30.5 m); double 1 foot (305 mm) back for shorter runs.

Install a conduit expansion joint, detailed in the Contract, where the conduit crosses a fixed or structure expansion joint. Equip each expansion fitting with a grounding strap jumper. Thoroughly clean contact areas before clamping grounding straps.

Secure all conduit bonds, lighting bracket anchor bolts, and bridge rail anchor bolts to form a continuous mechanical and electrical system.

Clean out existing underground conduit incorporated into new conduit with compressed air and mandrel for size if required.

616.03.4 Pull Boxes and Manholes. Construct and install pull boxes and manholes as specified. The Contractor may install additional pull boxes to aide the work at its expense. Install pull boxes and manholes with covers level with curbs, sidewalks, and surrounding ground. Bed the box bottoms in concrete or crushed rock as specified.

616.04 METHOD OF MEASUREMENT.

616.04.1 Lump Sum. No measurement is made for conduit systems when the Contract specifies payment on a lump sum basis.

616.04.2 Unit Basis. Measurement for conduit systems specified in the Contract for payment on a unit price basis are made as follows:

A. **Conduit.** Conduit is measured by the linear foot (meter) to the nearest 1 foot (0.1 m).
B. **Manholes and Pull Boxes.** Manholes and pull boxes are measured by the unit.

616.05 BASIS OF PAYMENT. Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Conduit	Lump Sum
Conduit	Linear Foot (linear meter)
Manholes	Each
Pull Box	Each

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the Contract.